REMARKS/ARGUMENTS

REMARKS/ARGS

This Amendment is in response to the Office Action mailed on August 17, 2004 ("Office Action"). Claims 15-27 were rejected. In this Amendment, new claims 36-52 have been added. As a result, claims 15-27 and 36-52 are pending in the application.

Independent claim 15 has been rejected under 37 U.S.C. 102 as being anticipated by, or in the alternative obvious in view of, GB 1,564,630 ("Yee"). Claim 15 is directed at a resistive heater for heating a semiconductor processing chamber including an doped ceramic heating element and an undoped ceramic material encasing at least a portion of the heating element to form a monolithic plate. As described in the present application, there are a number of advantages to using such a heater for semiconductor processing. Among other things, the monolithic plate has strong mechanical properties (see page 11, lines 21-28), and may be used in some embodiments as a susceptor eliminating the need for a separate susceptor (see page 15, lines 9-11).

Yee discloses an electric heating element comprising at least three layers of ceramic material -- a doped ceramic material, a barrier layer and an undoped layer (see page 1, lines 29-30). In Yee, these layers are all part of the heating element and are not used to encase heating elements to form a monolithic plate heater. In fact, the exemplary heating element described in Yee is a hollow cylindrical rod heating element (see Figure 1 and page 3, lines 4-5). Yee does not disclose a resistive heater for semiconductor processing with a doped ceramic heating element encased with an undoped ceramic material to form a monolithic plate.

In the Office Action, the examiner argues that the intended use of the claimed apparatus (as a heater for semiconductor processing) does not distinguish Yee, because Yee has the capability to perform in this manner. However, Yee does not teach the claimed structure of a doped ceramic heating element encased with an undoped ceramic material to form a monolithic plate. As a result, Yee does not anticipate claim 15.

In the Office Action, the examiner also cites MPEP 2131.01 and argues that Yee "is inherently capable of forming a monolithic plate as set forth in claim 15." MPEP 2131.01 is directed at the use of multiple references for making a rejection under 35 U.S.C. 102. Part III of MPEP

2131.01 describes how an extra reference or evidence can be used to show inherency. However, no reference or evidence cited by the examiner states that Yee does not disclose the claimed invention and the examiner has not cited any extra reference or extrinsic evidence to show that Yee inherently includes a doped ceramic heating element encased with an undoped ceramic material to form a monolithic plate. Moreover, MPEP 2131.01 states that a monolithic plate "evidence must make clear that the missing descriptive matter is *necessarily present* in the thing described in the reference." (emphasis added). It is not enough to argue that the heating element in Yee is theoretically capable of being used to form a monolithic plate, when there is no teaching to do so or evidence to show that this subject matter is *necessarily present* in the Yee reference. Therefore, claim 15 is not anticipated by Yee.

Moreover, claim 15 is not rendered obvious by Yee. Yee states that the heater elements disclosed in Yee can be used, for example, as igniter rods in gas turbine combustion chambers, in boiler combustion chambers and as heating elements in industrial and laboratory furnaces and ovens (see page 1, lines 6-8). The exemplary heating element described in Yee uses a thin (e.g., 0.54 mm) layer of Silicon Carbide around the outside diameter of the heating element (see page 4). Yee states that "Preferably, the heating element is produced by the chemical vapor deposition (CVD) process and comprises a hollow member" (see page 2, lines 62-63). "To ensure uniform deposition in all directions, the gases and vapours are delivered through three tubes disposed uniformly around and parallel to the graphite member" (see page 3, lines 55-56). "The production conditions . . . are of course optimized . . . to ensure great uniformity in the deposited diameter and in electrical resistance over the whole length of the element" (see page 3, lines 59-61). These teaching suggest thin coatings used as part of a heating element, not a monolithic plate heater that encases a doped ceramic heating element. For example, Yee describes a heating element formed from a circular cylindrical rod. The heating element retains its cylindrical shape and a thin outer undoped layer is uniformly deposited around the diameter (e.g., having a thickness of approximately 0.5-0.8 mm as described at page 3, lines 36-37). These teachings are directed at a thin layer uniformly deposited around a rod to form a heating element and would not result in a monolithic plate heater formed out of an undoped ceramic material as set forth in claim 15.

In addition, none of the other references cited in the office action by the Examiner teach the use of a resistive heater for semiconductor processing with a doped ceramic heating element encased with an undoped ceramic material to form a monolithic plate. While Chen discloses a multi-zone resistive heater that may be used for chemical vapor deposition (CVD), Chen does not disclose a doped ceramic heating element encased with an undoped ceramic material to form a monolithic plate. In Chen, separate heating elements are positioned at different planes within a susceptor. The exemplary heating elements described in Chen are very thin (e.g., 2 mils) traces of molybdenum (see column 11, lines 63-65) and are not part of a monolithic plate formed by encasing a doped ceramic with an undoped ceramic as set forth in claim 15 of the present application. Moreover, even if these very thin (e.g., 2 mils) trace heating elements were coated with a thin, uniform CVD layer as described in Yee, it would not result in a monolithic plate heater as set forth in claim 15.

In view of the foregoing, independent claim 15 is believed to be patentable. Claims 16-27 depend from claim 15, and accordingly, these claims are also believed to be patentable.

New claims 36-52 have been added. These claims are directed at additional aspects of the invention that are advantageous for semiconductor processing. Independent claim 36 is directed at an undoped ceramic material covering a doped ceramic heating element to form a heating surface shaped to receive a semiconductor wafer. Claims 37-43 depend from claim 36. Independent claim 44 is directed at a doped ceramic heating element forming a trace having a plurality of adjacent segments, and an undoped ceramic material between the adjacent segments and forming a continuous surface for heating a semiconductor wafer. Claims 45-46 depend from claim 44. Independent claim 47 is directed at a susceptor comprising an undoped ceramic material shaped to receive a semiconductor substrate, and a doped ceramic heating element at least partially embedded within the susceptor. Independent claim 48 is directed at an undoped ceramic material between a first doped ceramic heating element and a second doped ceramic heating element that forms a continuous surface for heating a semiconductor wafer. Claims 49-52 depend from claim 48.

The use of an undoped ceramic material in the claimed manner to form a susceptor or heating surface shaped to receive a semiconductor wafer, to bridge adjacent segments of a heating element

or to bridge two different heating elements is not disclosed in Yee. Accordingly, claims 36-52 are believed to be patentable.

CONCLUSION

Applicants submit that the instant application is in condition for allowance. Should the Examiner have any questions, the Examiner is requested to contact the undersigned attorney.

The Commissioner is authorized to charge any additional fees which may be required, including petition fees and extension of time fees, to Deposit Account No. 23-2415 (Docket No. 14912.832).

Respectfully submitted,

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